



## Fact Sheet

Aquifer Protection Permit #P-105889

Place ID 128125, LTF 44254

City of Avondale McDowell Recharge Basins

The Arizona Department of Environmental Quality (ADEQ) proposes to issue the Aquifer Protection Permit for the subject facility that covers the life of the facility, including operational, closure, and post-closure periods unless suspended or revoked pursuant to A.A.C. R18-9-A213. This document gives pertinent information concerning the issuance of the permit. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards (AWQS) at the Point of Compliance; and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). The purpose of BADCT is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., local subsurface geology) to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer, or to keep pollutants from reaching the aquifer.

### I. FACILITY INFORMATION

#### Name and Location

Name of Permittee:	City of Avondale
Mailing Address:	399 East Lower Buckeye Road, Suite 100 Avondale, Arizona 85323
Facility Name and Location:	City of Avondale McDowell Recharge Basins 12100 West McDowell Road Avondale, Arizona 85323 Maricopa County

#### Regulatory Status

An application for an Aquifer Protection Permit (APP) for this facility was received on May 17, 2007.

This is a new facility and there are no known compliance issues or violations

#### Facility Description

The facility is an underground storage, or recharge facility which is designed to recharge up to 13.5 million gallons per day (MGD) or 15,000 acre-feet per year, a combination of Central Arizona Project (CAP) water and Salt River Project (SRP) water from the Crystal Garden Wetlands and treated effluent from City of Avondale Water Reclamation Facility (WRF, P-100573).

The McDowell Recharge Basins (Basins) are located north of McDowell Road adjacent to the east bank of the Agua Fria River. The Basins comprise twenty seven acres of recharge basins with four individual recharge basins surrounded by 6-foot berms. The individual basins are laid out in an irregularly shaped pattern to conform to the local topography. The overall shape of the facility is triangular. The facility has an Underground Storage Permit (# 71-565257) issued by the Arizona

Department of Water Resources (ADWR). Operating depth of the basins range from 2 to 4 feet and is controlled by a gate valve at the recharge weir to govern the flow to each basin. Water levels will be varied in order to optimize infiltration rates. The flow rate of incoming surface water from wetlands and reclaimed water from the WRF will be measured separately at the recharge weirs before flow splitting to the basins.

Recharge creates a “mound” at the top of the water table. Reviewing the operational history, it appears that in the area of the Basins, the top of the water table generally ranges from ~ 65 to 95 feet below ground surface (bgs) in response to recharge. The depth to water in the area is approximately 85 feet bgs. The average groundwater flow direction in the vicinity of the basins is to the northwest, and west-northwest.

The permittee shall not begin to recharge Water Reclamation Facility effluent to basins until eight ambient groundwater sampling events have been completed and notified ADEQ.

## **II. BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY (BADCT)**

Not applicable per A.A.C. R 18-9A201(C) for a storage facility

## **III. HYDROGEOLOGIC SETTING**

The Gila River and its principal tributaries, the Salt River, the Agua Fria River, and the Hassayampa River, drain the West Salt River Valley. The West Salt River Valley is a deep alluvial basin bounded by bedrock mountain ranges consisting primarily of granitic, metamorphic and volcanic rocks of Precambrian to Tertiary age. Mountain ranges surrounding the basin include the Hieroglyphic Mountains, the Phoenix Mountains, South Mountain, the Sierra Estrella Mountains, the Buckeye Hills, and the White Tank Mountains. The mountain ranges form nearly impermeable barriers to groundwater flow. The basin consists of unconsolidated to semi-consolidated clastic sediments of Late Tertiary to Quaternary age, including alluvial fan, playa, and fluvial deposits. The thickness of the basin-fill deposits varies from 0 feet near the basin margins to over 10,000 feet in the central part of the basin. The thickest basin-fill deposits occur near Luke Air Force Base, where the Luke Salt Body a massive evaporite deposit, is located. The basin-fill deposits generally increase in thickness and decrease in grain size toward the center of the basin. The basin-fill deposits have been subdivided into three hydrogeologic units:

Upper Alluvial Unit (UAU): Mostly unconsolidated gravel, sand and silt with locally strong cementation near mountain fronts and major stream courses. Hydraulic conductivity values range from 8 to 200 ft/day. Specific yield ranges from 7 to 20 %.

Middle Alluvial Unit (MAU): Mostly weakly consolidated silt, siltstone, silty sand and gravel. Most commonly present in the center of the basin, this unit typically pinches out toward basin boundaries. Hydraulic conductivity values range from 1 to 30 ft/day. Specific yield ranges from 3 to 10 %.

Lower Alluvial Unit (LAU): Moderately to well-cemented clays, silts, mudstone, evaporites (includes the Luke Salt Body), sandstone, gravel, conglomerate, and andesitic basalt. The LAU may be divided into an upper and lower part with the upper part consisting of interbedded sand, gravel and conglomerate. Hydraulic conductivity values range from 1 to 30 ft/day. Specific yield ranges from 3 to 10 %.

The shallow soils (less than 10 feet depth) are typically poorly graded sand or sand with silt. Between 10 and 50 feet, the soils are poorly graded sand or silty sand with layers of gravel, silty clay or sandy clay. The fine grained layers are laterally discontinuous. Instantaneous infiltration rates typically range from 2 to 4 ft/day.

The principal aquifers correspond to the basin-fill subdivisions. The UAU aquifer is generally unconfined; the MAU ranges from unconfined to semi-confined; and the LAU ranges from semi-confined to confined conditions but may be unconfined if the MAU is not present. Most of the groundwater in the basin flows toward two large cones of depression formed by groundwater pumping for agricultural irrigation. Depth to groundwater ranges from less than 30 feet below the ground surface along the Salt and Gila Rivers to more than 400 feet bgs near the Union Hills and in the area west of Luke Air Force Base.

The average groundwater flow direction in the vicinity of the Basins is to the northwest, and west-northwest, based on a groundwater elevation map prepared using winter 1997/1998 water level data. This data represents pre-recharge data and was collected during a period with limited agricultural pumping. This direction is towards the groundwater depression near the Luke Salt Body (also known as the Luke Sink). Measurements taken in 2001 indicate that a 30 to 40 foot groundwater mound has developed due to recharge at the site.

No known earth fissuring has occurred within 2 miles of the area.

#### **IV. STORM WATER/SURFACE WATER CONSIDERATIONS**

The recharge facility is located adjacent to the Agua Fria River, an ephemeral tributary to the Gila River within the West Salt River Valley.

Monitoring of nearby drainages is included as a permit condition because the location of the facility. Periodic (monthly) river bank inspections shall be required. Flowage of recharge water into the Agua Fria River shall trigger contingency actions.

The facility is located within the 100-year floodplain but is protected from flooding by an earthen berm and construction of the facility components above the 100-year flood elevation.

The City of Avondale's floodplain administrator has determined that the recharge basins are protected by engineering controls located within the Agua Fria River and along the east side of the basins. A letter from the City's Engineering Department (National Flood Insurance Program Community No. 040038) is included in the application.

#### **V. COMPLIANCE WITH AQUIFER WATER QUALITY STANDARDS**

Water quality was required to be collected by the USF permit from wells MW-1, MW-2, COA-10, COA-11 and COA-12. Water quality results from 2004 and 2005 are tabulated in Tables 4 and 5 of the Hargis Report. No AWQS were exceeded in the groundwater samples. Samples were not required by the USF permit to be tested for organics, PCBs, radionuclides, pathogens or turbidity. The closest well listed for domestic use is approximately 0.25 miles east of the recharge site.

The quality of the additional water (treated effluent from the WRF) to be discharge through the Basins is of similar or better quality than the water previously discharged. Therefore, no further degradation of the aquifer should occur.

The permittee is required to show that pollutants discharged will not cause or contribute to a violation of aquifer water quality standards at the points of compliance (POCs). The location of the POCs which show compliance with aquifer water quality standards is determined by an analysis of the pollutant management area (PMA), the discharge impact area (DIA), and locations and uses of groundwater wells in the area. The POC locations are selected to protect off-site uses of groundwater, and to allow early detection of potential impact to the aquifer from facility discharge.

The PMA is described in A.R.S. §49-244 as the limit projected in the horizontal plane of the area on which pollutants are or will be placed. The PMA includes horizontal space taken up by any liner, dike or other barrier designed to contain pollutants in the facility. If the facility contains more than one discharging activity, the PMA is described by an imaginary line circumscribing the several discharging activities. The PMA is defined by a line circumscribing all the recharge basins.

The DIA is defined by A.R.S. §49-201.13. The DIA means the potential areal extent of pollutant migration, as projected on the land surface, as the result of a discharge from a facility.

No changes in groundwater quality are expected because monitoring of the groundwater found no exceedances of AWQS attributed to the Basins when the source water was from the wetlands. The quality of the additional water from the WRF is of similar or better quality than the water from the wetlands. Therefore, the DIA has been defined by the extent of the groundwater mound or Area of Impact (AOI). The AOI, as defined by a one foot rise in the water table, is estimated to extend approximately 8 miles north, 7.5 miles south, 13 miles east, and 10 miles west of the Basins if 13.4 MGD (15,000 acre-feet/year) is continuously recharged for 20 years. Top of the recharge mound is estimated to be 42 feet bgs at piezometer P-1 after 20 years of continuous recharge.

### **Monitoring and Reporting Requirements**

Recharge creates a “mound” at the top of the water table. Reviewing the operational history, it appears that in the area of the Basins, the top of the water table generally ranges from ~ 65 to 95 feet bgs in response to recharge. The depth to water in the area is approximately 85 feet bgs. The average groundwater flow direction in the vicinity of the basins is to the northwest, and west-northwest. The nearest point of use in the aquifer is the closet well listed for domestic use which is approximately ¼ mile east of the recharge site. Groundwater quality monitoring will be conducted at POC #1, which is hazardous/non-hazardous point and also at MW-2 which is non-hazardous point of compliance monitor well. Groundwater elevations will be monitored at wells listed in Table IIC. An exceedance of the groundwater elevation alert level would trigger the contingency plan in Section 2.6.2.3.4.

### Point of Compliance (POC)

The Points of Compliance (POCs) are designated at the following locations:

POC #	POC Location	Latitude	Longitude
1	Located near Basin 4 at the northeast corner of the entire facility, MW-1.	33°28'12" N	112°19'12.9" W
2	Located at south of the southwest corner of the basins in Friendship Village which is more than 750 feet from PMA, MW-2.	33°27'42.2" N	112°19'18.3" W
3	Located at south of the center of the basins which is less than 750 feet from PMA, MW-3.	33°27'47.7" N	112°19'17.1" W

These POCs are not northwest of the facility as is the regional gradient. However, the POC locations are within groundwater mound caused by the operation of the basins and are downgradient at a local scale. The POCs are within the DIA.

Three POCs are designated for this facility. POC # 1: ADWR Well # 55-209055 is located near Basin 4 at the northeast corner of the entire facility. POC # 2: ADWR Well # 55-214588 is located at south of the southwest corner of the basins in Friendship Village which is more than 750 feet from PMA. POC # 3: is located at south of the center of the basins which is less than 750 feet from PMA. Currently groundwater monitoring is not required at POC # 3. However, if during routine groundwater monitoring at POC# 2 has two consecutive exceedances of an AL, or three exceedances of an AL in a one year period, a monitor well at POC #3 may be required in the future pursuant to the contingency requirements in the permit.

## **VI. COMPLIANCE SCHEDULE**

For each compliance schedule item listed below, the permittee shall submit the required information, including a cover letter that lists the compliance schedule items, to the Groundwater Section. A copy of the cover letter must also be submitted to the ADEQ Water Quality Compliance Section.

Description	Due by:
The permittee shall begin monthly ambient groundwater quality sampling for 8 consecutive months at the POCs MW-1 and MW-2 for the pollutants and parameters listed in section 4.2, Table IIA.	Within 30 days after permit issuance

The permittee shall submit a letter notifying that eight sampling events have been completed. Include in the letter the dates of eight sampling events.	Within 30 days of completing the last sampling event
Commence Recharge operations	After completing eight rounds of sampling events and notifying ADEQ
The permittee shall submit a report on the groundwater quality data collected from the POC wells, along with a request to amend the permit with a recommendation for setting ALs and AQLs for parameters listed in Table IIB, Routine Groundwater Monitoring.	Within 12 months of permit issuance.
During routine groundwater monitoring (Table IIB), if any of the AQLs for nitrogen and total coliform or ALs for other constituents at MW-2 have two consecutive exceedances or three exceedances in a one year period, then MW-3 shall be installed and monitored. Well design for MW-3 shall be similar to MW-1 and MW-2. The screened interval shall intersect the water table and be 60 feet or less in length. The location of MW-3 has already been established.	Within 90 days after the test results are known.
Submit an amendment to include MW-3 as a POC well.	Within 60 days of any exceedance of a parameter as discussed in the above item.

## VII. OTHER REQUIREMENTS FOR ISSUING THIS PERMIT

### Technical Capability

City of Avondale has demonstrated the technical competence necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A202(B). The Recharge Site was designed according to the Aquifer Protection Permit (APP) Application prepared by Christine H. Close, P.E., Damon S. Williams Associates, LLC, dated May 16, 2007.

The permit requires that appropriate documents be sealed by an Arizona registered geologist or professional engineer. This requirement is a part of an on-going demonstration of technical capability. The permittee is expected to maintain technical capability throughout the life of the facility.

### **Financial Capability**

City of Avondale has demonstrated the financial responsibility necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A203. The permittee is expected to maintain financial capability throughout the life of the facility.

The permittee has submitted a closure and post-closure cost estimate of \$166,680. The permittee submitted a report to demonstrate financial capability, as per R18-9-A203 (B).

### **Zoning Requirements**

The City of Avondale McDowell Recharge Basins has been properly zoned for the permitted use and the permittee has complied with all zoning ordinances in accordance with A.R.S. § 49-243(O) and A.A.C. R18-9-A201(A)(2)(c).

## **VIII. ADMINISTRATIVE INFORMATION**

### **Public Notice (A.A.C. R18-9-108(A))**

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft permit or other significant action with respect to a permit or application. The aquifer protection program rules require that permits be public noticed in a newspaper of general circulation within the area affected by the facility or activity and provide a minimum of 30 calendar days for interested parties to respond in writing to ADEQ. The basic intent of this requirement is to ensure that all interested parties have an opportunity to comment on significant actions of the permitting agency with respect to a permit application or permit.

The public notice for this permit was published in the West Valley View on Tuesday, March 3<sup>rd</sup> under public notice no. 26-09

### **Public Comment Period (A.A.C. R18-9-109(A))**

The Department shall accept written comments from the public before a significant permit amendment is made. The written public comment period begins on the publication date of the public notice and extends for 30 calendar days. After the closing of the public comment period, ADEQ is required to respond to all significant comments at the time a final permit decision is reached or at the same time a final permit is actually issued.

**Public Hearing (A.A.C R18-9-109(B))**

A public hearing may be requested in writing by any interested party. The request should state the nature of the issues proposed to be raised during the hearing. A public hearing will be held if the Director determines there is a significant amount of interest expressed during the 30-day public comment period, or if significant new issues arise that were not considered during the permitting process.

**IX. ADDITIONAL INFORMATION**

Additional information relating to this permit may be obtained from:

Arizona Department of Environmental Quality  
Water Quality Division - Groundwater Section - APP and Reuse Unit  
Attn: Swathi Kasanneni  
1110 West Washington Street, Mail Code 5415B-3  
Phoenix, Arizona 85007  
Phone: (602) 771-4577